



AF 11763

Docket No.: 2328-049

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Tuqiang NI

U.S. Patent Application No. 09/689,616

Filed: October 13, 2000

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Group Art Unit: 1763

Examiner: Alejandro Mulero, Luz L.

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For: ETCH CHAMBER WITH HYBRID PLASMA SOURCE

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO FINAL REJECTION

Applicants respond to the May 23, 2003 Office Action as follows:

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August 20, 2003

Applicants note the allowance of claims 25-32 and the indication of claims 7-14 and 40-44 containing allowable subject matter.

Applicants traverse the rejection of claims 1-6, 17, 18 and 22-24 as being obvious as a result of Baldwin et al. WO 99-34,399 in view of Collins et al. U.S. Patent 6,077,384 and Ishii et al. U.S. Patent 5,795,429. A basic requirement of establishing a *prima facie* case of obviousness is that there must be some suggestion or motivation, either in the references themselves or in knowledge available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ 2d 1438 (Fed. Cir. 1991); MPEP Section 2143; *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ 1453, 1457-58 (Fed. Cir. 1998). "In determining the propriety of the patent office case for obviousness in the first case, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed combination, substitution or other modification." *In re: Linter* 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CC PA 1972). Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would suggest to those of ordinary skill in the art." *In re Kotzab* 217 F.3d 1365, 1370, 55 USPQ 2d 1313, 1317 (Fed. Cir. 2000). The mere fact that references can be modified or combined does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills* 916 F.2d 680, 16 USPQ 1430 (Fed. Cir. 1990). Although a prior art device may be

capable of being modified from the apparatus as claimed, there must be a suggestion or motivation in the reference to do so. *916 F.2d at 682, 16 USPQ 2d. at 1432.*

The proposed combination of Baldwin et al. Collins et al. and Ichii et al. does not meet these requirements. In fact, consideration of the overall teachings of the references points away from claim 1, upon which claims 2-6, 17, 18 and 22-24 depend. The Examiner's reliance on a statement in Collins et al. that the semiconductor has a resistivity of 0.01 ohm-centimeter ignores the fact that Collins et al. states that this prior art approach is undesirable because the frequency of the source would have to be undesirably reduced if such a low resistivity semiconductor were employed. Collins et al., instead, teaches a semiconductor with a resistivity of 35 ohm-centimeters. One reading Collins et al. would assume that it would be undesirable to modify Baldwin et al. to include a semiconductor having a resistivity of 0.01 ohm-centimeter. Hence, the combination of references does not provide a motivation to combine the references. Instead, the combination provides a motivation not to combine the 0.01 ohm-centimeter semiconductor because Collins et al. points away from the combination the Examiner says is obvious. It is necessary to consider a reference in its entirety when considering the issue of obviousness under 35 USC §103. A consideration of Baldwin and the entirety of the Collins patent indicates one of ordinary skill in the art would have been led away from adopting a semiconductor having a resistivity of 0.01 ohm-centimeter in the Baldwin et al. device.

The Examiner's comment that it would have been obvious to one of ordinary skill in the art to make the semiconductor electrode as conductive as possible to provide a more energized plasma flies in the face of the Collins et al. disclosure as a whole. The Collins et al. disclosure, as a whole, indicates it is undesirable to provide a high conductivity semiconductor electrode because Collins et al. says the prior art semiconductor electrode having a resistivity of 0.01 ohm-centimeters is undesirable; to obviate the problem Collins et al. employs a semiconductor having a resistivity of 35 ohm-centimeters.

Applicants cannot agree with the Examiner's conclusion concerning Ishii, et al. The Examiner relies on Ishii et al. to disclose a non-magnetic metal arrangement 30 which enables substantial electric and magnetic field components from the outer peripheral portions of coil 24 to be incident on the plasma and to prevent electric field components from being incident on the top central portion of the chamber. The Examiner says it would have been obvious to modify Baldwin to include such an arrangement. However, the Examiner gives no adequate reason why one of ordinary skill in the art would have been motivated to modify Baldwin et al. to include this feature.

Baldwin et al. is directed to a plasma chamber having a powered shield electrode, in combination with a coil. The shield electrode delivers electric field to the entire region in the chamber. The Examiner has given no adequate reason why one of ordinary skill in the art would have been motivated to modify the Baldwin et al. device to prevent substantial electric field components from being incident on a top central portion of the chamber. In fact, one of ordinary skill would not want to modify Baldwin et al. to prevent substantial electric field components from being incident on a top central portion of the chamber. Baldwin et al. employs powered shield 44 that (1) functions as a consumable solid for uniform sputtering purposes (page 7, lines 12-16), or (2) enables removal of metal ions from the chamber window where shield 44 is located (page 8, lines 5-21), or (3) ignites the gas in the chamber to a plasma (page 9, lines 5-9), or (4) stabilizes plasma excited by a coil, wherein the shield is between the coil and the plasma, or (5) uniformly couples an RF stabilizing current to the plasma (page 9, line 25-page 10, line 4), or (6) cleans the chamber window during or after workpiece processing (page 10, lines 11-36). In all of these uses of the Baldwin et al. device, the field from powered shield 44 is desirably uniformly coupled to the plasma. The Examiner's proposal is thus contrary to Baldwin's objectives in locating powered shield 44 between the coil and the chamber window. Consequently, one of ordinary skill would not have modified Baldwin et al. so the electric field in the center of the chamber is minimized.

Applicants cannot agree with the Examiner's comment about claims 4 and 6 that abutting the non-magnetic metal member and the semiconductor member is an obvious matter of choice. The Examiner's position with regard to these claims ignores the fact that in Baldwin et al. the non-magnetic metal member 44 abuts the dielectric window. The Examiner's position that one of ordinary skill in the art would have modified Baldwin et al. by dividing member 44 in half to provide first and second members, as claimed, is wrong. There is no motivation to divide the Baldwin et al. powered shield 44 in half. In fact, the opposite is true. If powered shield 44 were divided into two pieces, as suggested by the Examiner, there are disadvantages; viz: the resistivity of the metal member is increased; the structure becomes more expensive; and there is a likelihood of oxidation between the two pieces to reduce the effectiveness of the structure. Consequently, the Examiner's proposal with regard to claims 4 and 6 is contrary to the requirements of 35 USC §103.

There is also no motivation to substitute a semiconductor electrode for the Baldwin et al. powered metal shield 44. The Baldwin et al. powered metal shield 44 enables many different features to be attained, as described supra. There is no suggestion in the prior art that one of ordinary skill in the art would have been motivated to replace the Baldwin et al. powered metal shield with a semiconductor electrode as Collins et al. discloses, to provide the aforementioned features. Because of the orders of magnitude difference in resistivities between of the Baldwin et al. metal powered shield 44 (made of copper or aluminum) and the semiconductor electrode of Collins et al. it is doubtful that the structure proposed by the Examiner would be capable of attaining the results Baldwin et al. desires. Hence, the Examiner has not only failed to provide an adequate rationale for the proposed combination, the proposed combination appears to be contrary to the purpose of the Baldwin et al. device.

The Examiner says the comments about claim 4 in the previous response are merely attorney arguments. The Examiner is incorrect because the comments about claim 4 are supported by the electric field plots illustrated in Figures 3-5 of application as filed.

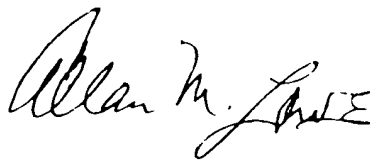
In view of the foregoing amendments and remarks, favorable reconsideration and allowance are respectfully requested and deemed in order.

To the extent necessary, Applicants petition for an extension of time under 37 C.F.R. 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayments to Deposit Account 07-1337.

Respectfully submitted,

LOWE HAUPTMAN GILMAN & BERNER,

LLP

A handwritten signature in cursive script, appearing to read "Allan M. Lowe".

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